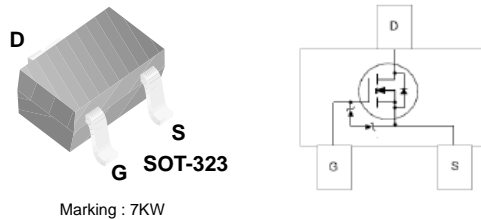


2N7002KW

N-Channel Enhancement Mode Field Effect Transistor

Features

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- Pb Free/RoHS Compliant
- ESD HBM=1000V as per JESD22 A114 and ESD CDM=1500V as per JESD22 C101



Absolute Maximum Ratings * $T_A = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Value | Units |
|-----------|--------------------------------------|---------------------------|------------------|
| V_{DSS} | Drain-Source Voltage | 60 | V |
| V_{GSS} | Gate-Source Voltage | ± 20 | V |
| I_D | Maximum Drain Current | - Continuous | 310 |
| | | $T_J = 100^\circ\text{C}$ | 195 |
| | | - Pulsed | 1.2 |
| T_J | Operating Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

Thermal Characteristics

| Symbol | Parameter | Value | Units |
|-----------------|---|-------|---------------------------|
| P_D | Total Device Dissipation | 300 | mW |
| | Derating above $T_A = 25^\circ\text{C}$ | 2.4 | mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient * | 410 | $^\circ\text{C}/\text{W}$ |

* Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch. Minimum land pad size

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|--|------|------|----------------------|--|
| Off Characteristics | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 10\mu A$ | 60 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 60V, V_{GS} = 0V$ $V_{DS} = 60V, V_{GS} = 0V, T_J = 125^\circ\text{C}$ | | | 1.0 0.5 | μA mA |
| I_{GSS} | Gate-Body Leakage | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | ± 10 | μA |
| On Characteristics (Note1) | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.1 | | 2.1 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 500mA$ $V_{GS} = 10V, I_D = 500mA, T_J = 100^\circ\text{C}$ $V_{GS} = 5V, I_D = 50mA$ $V_{GS} = 5V, I_D = 50mA, T_J = 100^\circ\text{C}$ | | | 1.6 2.4 2 3 | Ω Ω Ω Ω |
| $V_{DS(on)}$ | Drain-Source On-Voltage | $V_{GS} = 10V, I_D = 500mA$ $V_{GS} = 5V, I_D = 50mA$ | | | 3.75 1.5 | V V |
| $I_{D(on)}$ | On-State Drain Current | $V_{GS} = 10V, V_{DS} = 2V$ | 500 | | | mA |
| g_{FS} | Forward Transconductance | $V_{DS} = 2V, I_D = 0.2A$ | 80 | | | mS |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz$ | | | 50 | pF |
| C_{oss} | Output Capacitance | | | | 25 | pF |
| C_{rss} | Reverse Transfer Capacitance | | | | 5 | pF |
| Switching Characteristics | | | | | | |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{DD} = 30V, R_L = 150\Omega, V_{GS} = 10V,$ $I_D = 200mA, R_{GEN} = 25\Omega$ | | | 20 | ns |
| $t_{D(off)}$ | Turn-Off Delay Time | | | | 60 | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain-Source Diode Forward Current | | | | 115 | mA |
| I_{SM} | Maximum Pulsed Drain-Source Diode Forward Current | | | | 0.8 | A |
| V_{SD} | Drain-Source Diode Forward Voltage | $V_{GS} = 0V, I_S = 115mA$ | | | 1.1 | V |

Note1 : 1. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%.

Typical Performance Characteristics

Figure 1. On-Region Characteristics.

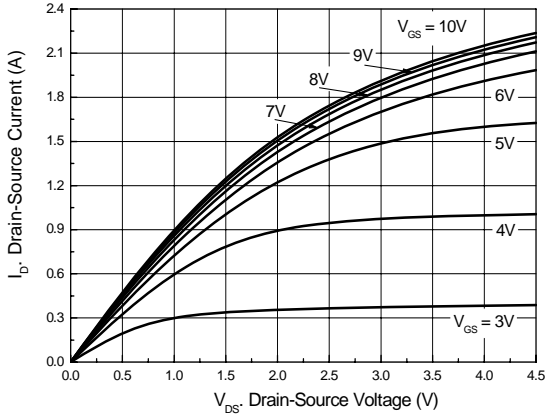


Figure 2. On-Resistance Variation with Temperature.

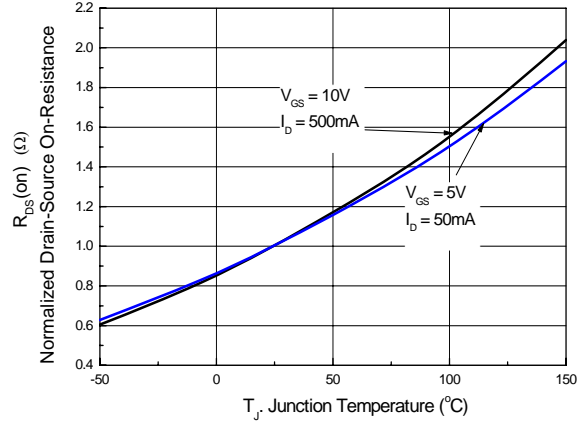


Figure 3. On-Resistance Variation with Gate Voltage and Drain Current.

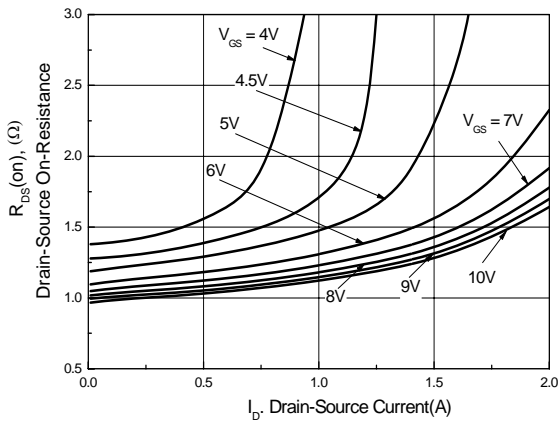


Figure 4. On-Resistance Variation with Drain Current and Temperature.

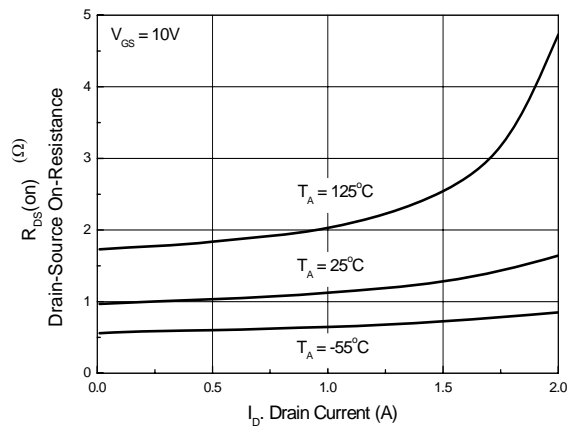


Figure 5. Transfer Characteristics

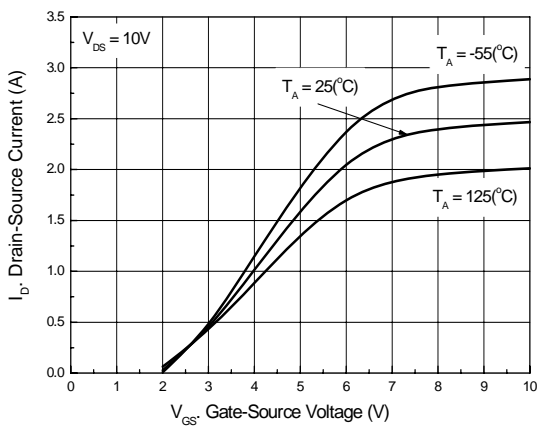
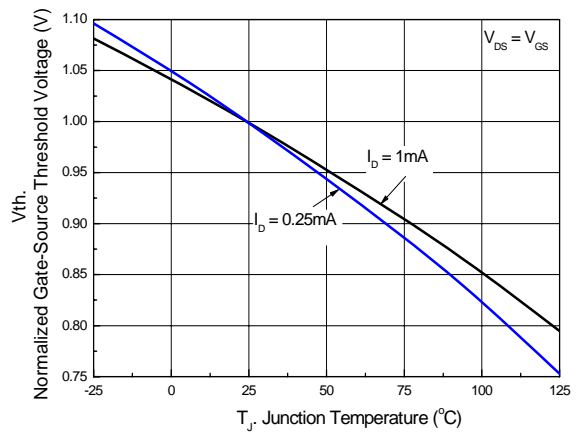


Figure 6. Gate Threshold Variation with Temperature.



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation with Temperature

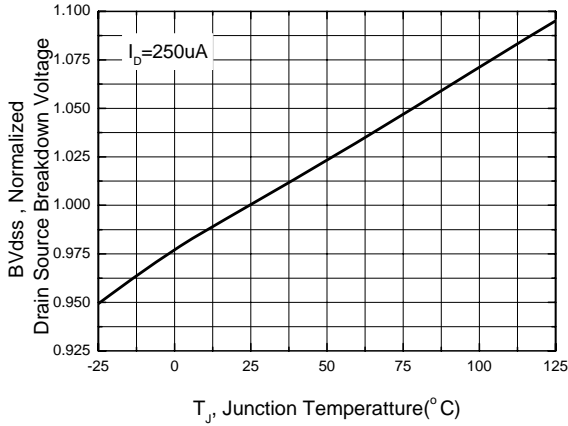


Figure 8. Body Diode Forward Voltage Variation with Source Current and Temperature.

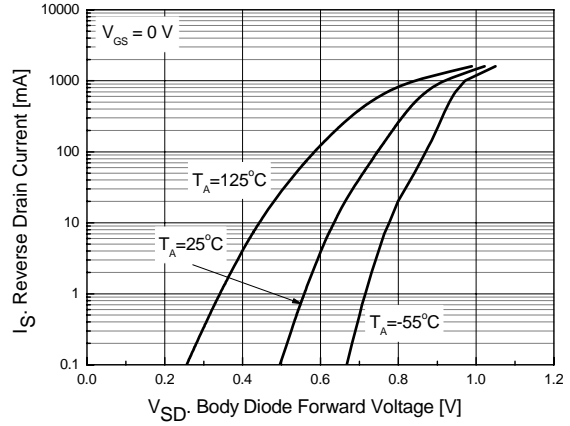


Figure 9. Capacitance Characteristics.

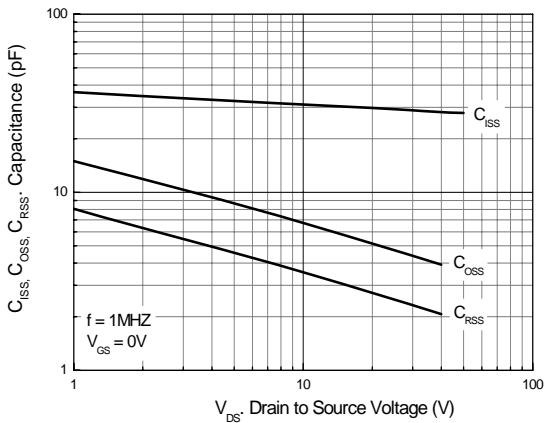


Figure 10. Gate Charge Characteristics.

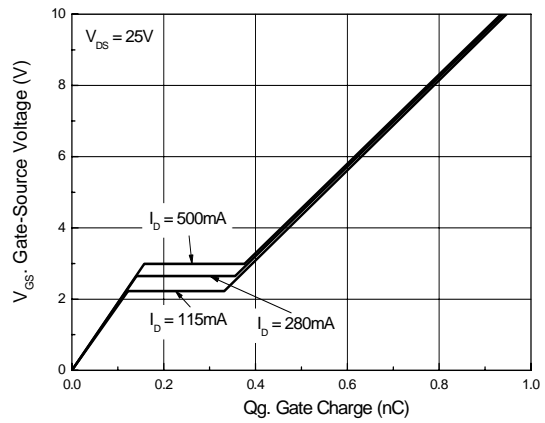


Figure 11. Maximum Safe Operating Area.

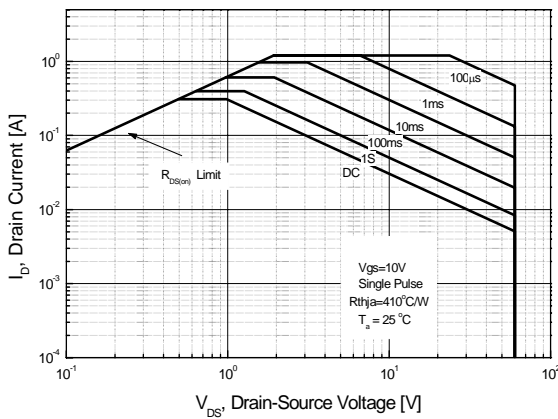
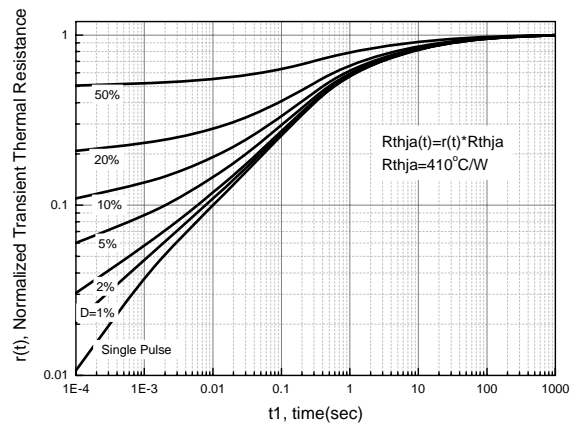
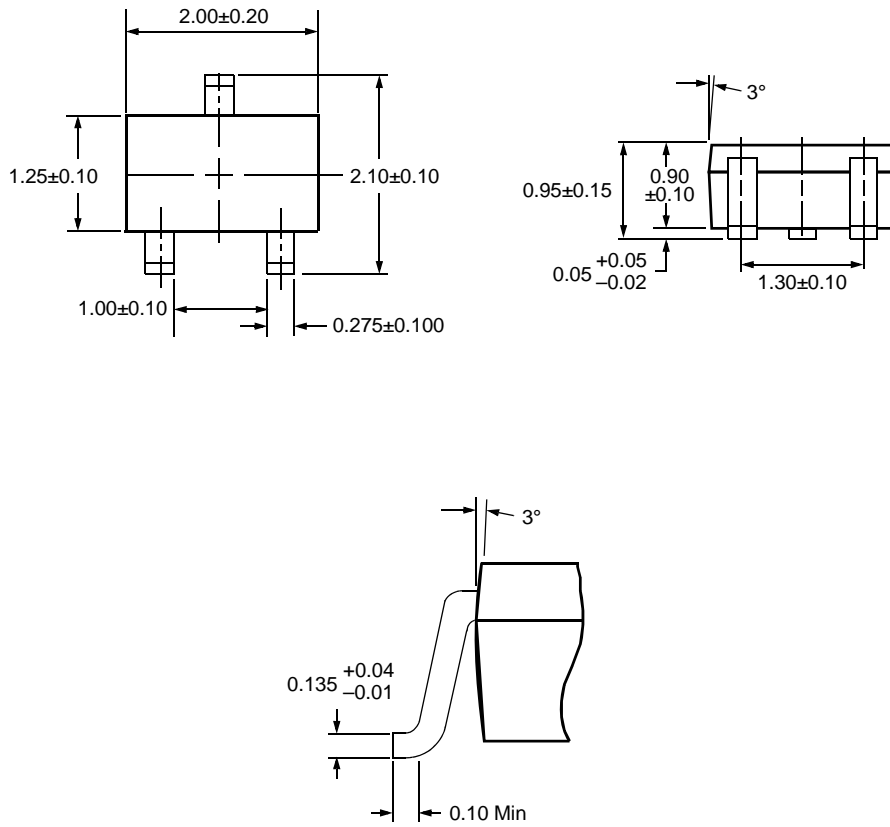


Figure 12. Transient Thermal Response Curve.



Physical Dimensions

SOT-323








Dimensions in Millimeters



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